

WE CLAIM:

1. A process for the removal of carbon dioxide from flue gas comprising the steps of:
  - (a) contacting the flue gas with a solvent in a solvent extraction zone thereby extracting carbon dioxide from flue gas and providing a carbon dioxide-depleted flue gas and a carbon dioxide-containing solvent;
  - (b) heating said carbon dioxide-containing solvent to a solvent regeneration temperature and maintaining the solvent at said temperature in a solvent regeneration zone thereby regenerating the solvent and providing a regenerated solvent and a carbon dioxide stream; and
  - (c) contacting said carbon dioxide stream with silicate particles dispersed in an aqueous solution in a mineral carbonation zone said silicate particles being a bivalent alkaline earth metal silicate.
2. The process of claim 1 wherein the heat released in step (c) is used in step (b).
3. The process of claim 1 wherein at least 50% of the heat needed for step (b) is supplied by the heat released in step (c).
4. The process of claim 1 wherein the temperature of contact in the mineral carbonation zone is in the range of 25°C to 35°C higher than the solvent regeneration temperature.
5. The process of claim 1 wherein the solvent regeneration temperature is in the range of from 100°C and 200°C.
6. The process of claim 1 wherein the solvent regeneration temperature is in the range of from 120°C and 180°C.
7. The process of claim 1 wherein the carbon dioxide stream obtained in step (b) is pressurized to a

pressure in the range of from 3 to 15 bar (absolute), before being reacted with the silicate in the mineral carbonation zone.

8. The process of claim 1 wherein the contact temperature in the mineral carbonation zone is in the range of from 140 to 200 °C.

9. The process of claim 1 wherein the solvent is an aqueous amine solution.

10. The process of claim 2 wherein the solvent is an aqueous amine solution.

11. The process of claim 4 wherein the solvent is an aqueous amine solution.

12. The process of claim 9 wherein the solvent is selected from the group consisting of an aqueous solution of monoethanolamine, diethanolamine, triethanolamine, diglycolamine, methyldiethanolamine, diisopropanolamine, and a combination of two or more thereof.

13. The process of claim 10 wherein the temperature of contact in the mineral carbonation zone is in the range of 25°C to 35°C higher than the solvent regeneration temperature.

14. The process of claim 10 wherein the solvent regeneration temperature is in the range of from 100°C and 200°C.

15. The process of claim 14 wherein the solvent is selected from the group consisting of an aqueous solution of monoethanolamine, diethanolamine, triethanolamine, diglycolamine, methyldiethanolamine, diisopropanolamine, and a combination of two or more thereof.

16. The process of claim 1 wherein the bivalent alkaline earth metal silicate is a magnesium or calcium silicate.

17. The process of claim 1 wherein the silicates particles have an average diameter of at most 0.5 mm.

18. The process of claim 11 wherein the silicates particles have an average diameter of at most 0.2 mm.

19. A process for the removal of carbon dioxide from flue gas comprising the steps of:

(a) contacting the flue gas with a solvent effective to extract carbon dioxide from flue gas in a solvent extraction zone thereby extracting carbon dioxide from flue gas and providing a carbon dioxide-depleted flue gas and a carbon dioxide-containing solvent;

(b) heating said carbon dioxide-containing solvent to a temperature in the range of from 100°C and 200°C and maintaining the solvent at said temperature in a solvent regeneration zone wherein at least 50% of the heat needed is supplied by the heat released in step

(c) thereby regenerating the solvent and providing a regenerated solvent and a carbon dioxide stream; and

(c) contacting said carbon dioxide stream with silicate particles dispersed in an aqueous solution in a mineral carbonation zone said silicate particles being a bivalent alkaline earth metal silicate.

20. The process of claim 19 wherein the solvent is an aqueous amine solution.